



Office de la Propriété
Intellectuelle
du Canada
Un organisme
d'Industrie Canada

Canadian
Intellectual Property
Office
An agency of
Industry Canada

PCT/CA 2004 / 001498

CA 2389770 A1 2003/12/07

(21) 2 389 770

(12) DEMANDE DE BREVET CANADIEN
CANADIAN PATENT APPLICATION

(13) A1

(22) Date de dépôt/Filing Date: 2002/06/07

(41) Mise à la disp. pub./Open to Public Insp.: 2003/12/07

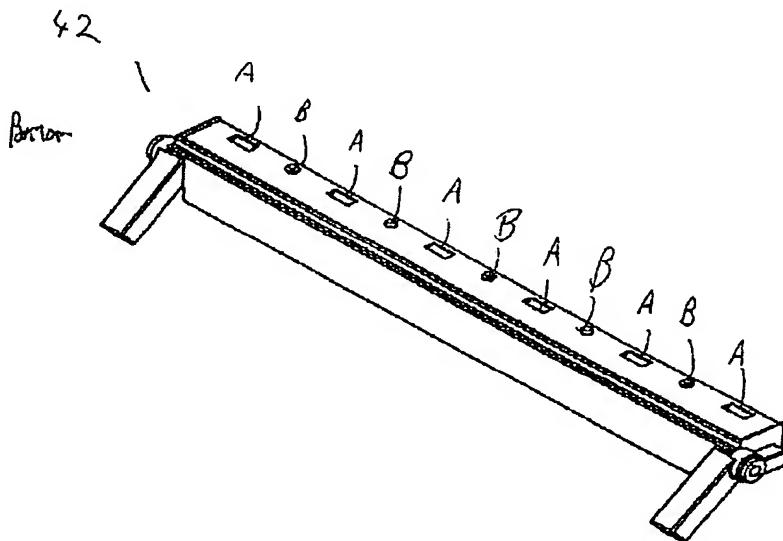
(51) Cl.Int.⁷/Int.Cl.⁷ A01D 34/52

(71) Demandeur/Applicant:
SUNCADDY CANADA INC., CA

(72) Inventeur/Inventor:
BUCHKO, JEFF, CA

(74) Agent: FURMAN & KALLIO

(54) Titre : FIXATION AIMANTEE DE CONTRE-LAME DANS UNE TONDEUSE MANUELLE
(54) Title: MAGNETIC ATTACHMENT OF BEDKNIFE IN A REEL MOWER ASSEMBLY



(57) Abrégé/Abstract:

A foliage mowing apparatus and mowing reel assembly wherein the bedknife is attached to the support frame magnetically, with or without alignment guides. Attachment of the bedknife magnetically, rather than with screws or bolts as has been done in the prior art, offers significant labor savings and safety aspects.

Canada

<http://opic.gc.ca> · Ottawa-Hull K1A 0C9 · <http://cipo.gc.ca>

OPIC · CIPO 191

OPIC CIPO



- Page 1 -

ABSTRACT

A foliage mowing apparatus and mowing reel assembly wherein the bedknife is attached to the support frame magnetically, with or without alignment guides. Attachment of the
5 bedknife magnetically, rather than with screws or bolts as has been done in the prior art, offers significant labor savings and safety aspects.

- Page 2 -

MAGNETIC ATTACHMENT OF BEDKNIFE IN A REEL MOWER ASSEMBLY

5 This invention generally relates to improved mower reel units and mowing devices incorporating such units. More specifically, it relates to an alternative method of attaching the blade to the blade support assembly in such a mower reel unit which would allow for improved safety and usability features.

10 **BACKGROUND**

Reel mowers and mower units using reel mowing assemblies are generally known in the art. For example, U.S. Patent Nos. 5,291,724, 5,477,666 and 6,318,059 demonstrate some of the work or innovation in the field. While those particular patents deal with a mower reel with 15 axially offset Chevron blade apexes, they demonstrate the relevant generic parts of a reel mower assembly. Figure 1 attached hereto demonstrates one type of a reel mower assembly as is known in the prior art. That particular unit shows an engine and a frame and two wheels mounted thereon, such that that particular unit appears to be one that would be moved by hand by an operator. However, the reel assembly on the front thereof is similar to those 20 used in larger reel mowers which would potentially include multiple reel assemblies.

- Page 3 -

Figure 2 demonstrates from a side view the operative parts or construction of a prior art reel mower assembly. Finally, and again for reference purposes, Figure 3 is an exploded view of the mower reel assembly of U.S. Patent No. 6,318,059, which will be used herein to demonstrate the new improvements of the present invention.

5

Referring to prior art Figures 1-3, the bed bar (42) is the support structure for the mower blade (39) which holds the mower blade (39) in position in the relating reel and the reel assembly of a rotary reel mower unit. The method of attachment of this blade (39) to the bed bar (42) has in all prior art situations been by way of a plurality of screws. Specifically, in
10 Figure 3 thirteen screw holes are shown in the blade (39) and support bar (42) through which screws are threaded to hold the blade (39) in place.

There are numerous problems or disadvantages of the bolting or screwing into position of the blade (39) which it is the intention of the present invention to endeavor to address. One of
15 the problems and the major scenario which it is desired to alter with the present invention is the amount of labor required to change the blades. For example, a reel mower assembly such as is used by a golf course or the like may contain eight or 10 individual mowing reel heads and, as such, to change eight or 10 separate blades would result in the need to remove at least eight sets of screws to change the blades. In most cases, the screws are not easily accessible
20 and the reel assembly has to, to some extent, be disassembled in order to change the blades.

- Page 4 -

The amount of labor required to change a set of blades in this scenario is significant, which results not only in high labor costs but also significant equipment downtime, as the change-over of a set of blades is accomplished.

- 5 A second disadvantage to a firmly bolted blade such as that shown in prior art Figures 1 to 3 is that by virtue of the fixed position of the blade with the plurality of screws holding it in place there is little to no ability for the blade to move upon the exertion of abnormal forces thereon. For example, if the reel assembly should in some unanticipated fashion pass over a rock or hit some other obstruction, the blade cannot move and this could potentially end up
10 in a bending of the blade and/or the reel assembly. If the blade and more particularly the reel are bent in any fashion, the repair work required on the reel head as a whole is substantial. As such, it would be desirable to come up with some type of a bed blade assembly that would in some fashion allow for these abnormalities and potentially minimize reel damage.

15 **SUMMARY OF THE INVENTION**

- It is the object of the present invention to provide an improved mower and reel as well as a retrofittable method of attachment of mower blades in existing reel mowers, that would allow for quick changing of the bed blades in the reel assembly without requiring significant labor,
20 tools or disassembly of the reel to accomplish the changing of the blades.

- Page 5 -

The objects of the invention are accomplished by creating a foliage mowing apparatus comprising a frame, said frame being transportable over foliage to be mowed; a bedknife mounted to said frame; and a reel unit rotatably mounted with respect to said frame, said reel 5 unit and said bedknife being in foliage cutting relationship with each other; wherein said bedknife is magnetically attached to said frame. The magnetic attachment of the bedknife to the frame has numerous advantages over the mechanical or screw attachment of all of the prior art. Specifically, by making the bedknife magnetically attached to the frame, it results in a quick change type of assembly where the bedknife can basically be changed by removing 10 it from the magnets and attaching another bedknife to the magnets in its place without the need to disassemble the reel unit at all from the remainder of the foliage mowing apparatus to access the screws holding the blade in place, as would be the case in the prior art assemblies.

Commercial grade magnets are available of sufficient strength such that when they are built 15 into the supporting frame for the bedknife in such a mowing apparatus, they will hold the bedknife in place in the absence of any abnormal force being encountered thereon. In addition to allowing for the quick changing of the blades, this magnetic attachment method also offers considerable safety advantages in terms of the integrity of the mower unit, where an obstruction such as a rock or the like might be encountered. Specifically, unlike the case 20 of a screwed-into-place bedknife, the magnetically attached bedknife of the present invention

- Page 6 -

would, if sufficient force were encountered upon hitting an obstruction, be pulled away from its magnetic attachment and be released, potentially resulting in minimizing or eliminating damage to the reel if a rock or some other such unit is encountered. By minimizing damage to the blade and/or the reel in such a circumstance, maintenance costs can again be
5 minimized.

While the Figures show 6 magnets in the bed bar, it will be understood that any number of magnets with adequate attractive force could be used, and all such variations are contemplated within the scope of the present invention.

10

Conventional magnets or electromagnets could be used to hold the bedknife in place. Where electromagnets are used, it would be even easier to release the blade from the frame, since by deactivation of the electromagnets the blades could easily be removed therefrom. Even in the case of non-electromagnets, that is to say standard magnets of commercial strength, the
15 only tool which would potentially be required to remove a bedknife from the frame would be a blade or the like to pry the items apart. Obviously, the strength of the magnets and number of magnets used in the frame to hold the bedknife in place could be adjusted or varied depending on the circumstances.

20 It will also be understood that in addition to manufacturing a completed new reel apparatus in

- Page 7 -

accordance with the present invention, a retrofit frame/bed bar could also be designed in accordance with the present invention to be retrofitted onto various existing reel mower units. This would also be contemplated within the scope of the present invention, insofar as it would still constitute a support frame for a bedknife which would allow for mechanical attachment thereto.

5 The present invention yields a relatively "tool-less" bedknife changing operation.

It is contemplated that alignment guides of some type might be provided on the support
10 frame for the bedknife and there might be some mating part or protrusion from the bedknife itself which would correspond with these alignment guides and allow for even more quick and precise placement of the blade in contact with the magnets on the support frame. For example, it is contemplated that small pegs or protrusions might be placed on the bottom of the support frame and corresponding holes might be made in the bedknife, which holes could
15 then engage the projections from the support frame when the blade was put in place, which would allow for the immediate proper alignment of the bedknife in relation to the support framework and would also provide a significant degree of shearing hold or mechanical hold to the blade – whereby the magnets will resist any normal separating force between the supporting frame or the bed bar and the bedknife, and the pegs or other similar mating or
20 corresponding protrusions or other similar alignment guides will provide significant shear

- Page 8 -

resistance against shearing forces exerted upon the bedknife during operation, will still allowing for release if the shearing forces are too great. It will be understood that this concept of a dowel or peg-like projection from the support framework is only one possible concept for the provision of an alignment guide or guides to help with the quick changing 5 and proper holding in place of the bedknife of the present invention and that any other types of similar alignment guides as could be contemplated by someone skilled in the art are contemplated within the scope of the present invention.

10 **DESCRIPTION OF THE DRAWINGS:**

While the invention is claimed in the concluding portions hereof, preferred embodiments are provided in the accompanying detailed description which may be best understood in conjunction with the accompanying diagrams where like parts in each of the several diagrams 15 are labeled with like numbers, and where:

Figure 1 is a perspective view of a self-propelled driven lawn mower including a reel mower unit, shown as prior art;

20 Figure 2 is a partial side elevation of a partial section showing the reel and bedknife

- Page 9 -

mounting arrangement of the prior unit of Fig. 1;

Figure 3 is an exploded perspective view showing the reel unit and typically bedknife mounting assembly of the prior art unit of Fig. 1 and 2;

5

Figure 4 shows the support frame of one embodiment of the present invention from a top view;

Figure 5 is a bottom view of the support frame of Figure 4; and

10

Figure 6 is a perspective view of an embodiment of the support frame and bedknife of the present invention.

15 **DETAILED DESCRIPTION OF THE ILLUSTRATED EMBODIMENTS:**

Figures 1 to 3 demonstrate a prior art reel cutting assembly in the field of the present invention and are discussed and further outlined above under the Background section of this patent application. Referring to Figures 4 to 6, there is shown the method of attachment of
20 the bedknife in a reel mower of the present invention. Figures 4 to 6 show one embodiment

- Page 10 -

of the present invention, although it will be understood that other embodiments as would be obvious to one skilled in the art are also contemplated within the scope of the present invention.

- 5 Shown in Figures 4 and 5 is the support frame, also known in the art as the bed bar, from a reel cutting assembly in accordance with the present invention. It will be understood that the present invention could be practiced in a number of fashions including by manufacturing new reel cutting assemblies in accordance with the present invention, or alternatively, by producing a retrofit bed bar or support frame kit which would allow the magnetic blade
10 attachment of the present invention to be implemented on an existing mower. Both such approaches are contemplated within the scope of the present invention.

In any event, the bed bar shown in Figures 4 and 5 in accordance with the present invention it will be noted does not have any screw holes in it for attaching a blade thereto.

- 15 There are shown the bar itself (42), which has 6 magnets (A) embedded therein. The magnets (A) are commercial strength magnets capable of holding the blade (39) in place during the normal operation of a reel cutting unit and the normal friction of the reel and grass thereon during normal cutting operations. The advantage to using the magnets (A) over screws as is the case in the prior art is that the blade (39) can be more easily and
20 quickly attached and detached, potentially without tools, or with only the use of a blade or

- Page 11 -

the like to pry apart the blade (39) from the bed bar (42).

Also shown in Figure 4 (bottom view) are alignment guides (B) on the support frame/bed bar (42). These alignment guides in this case are a plurality of dowel-like projections
5 from the bottom surface of the bed bar, which will match up with corresponding receptacles in the blade (39) to properly guide the blade (39) into alignment and position upon attachment. These projections in this case will also provide reinforcement against shearing forces exerted on the blade during operation, while still allowing the blade to give way if the shearing forces encountered are too severe.

10

Figure 6 also demonstrates the attachment of a support frame or bed bar (42) of the present invention to either a new or existing reel mower unit by way of attachment brackets or the like.

15 It will be understood that varying other types of alignment guides could be used in place of the dowel-like projections shown, and that any and all such guides as can be envisioned which would accomplish the goal of guiding the blade (39) into the proper position with the bed bar (42) and/or, but not necessarily, providing reinforcement against shearing forces, are contemplated within the scope of the present invention. In cases
20 where the shearing forces exerted upon the blade in operation are great, alignment guides

- Page 12 -

of this nature will provide significant shearing reinforcement, while the magnets will counter any normal separating forces between the bar and the knife.

Also contemplated within the scope of the present invention are the methods of
5 retrofitting an existing reel mower with the bed bar and/or blade of the present invention,
as well as the method of installing or replacing blades in a reel mower in accordance with
the present invention.

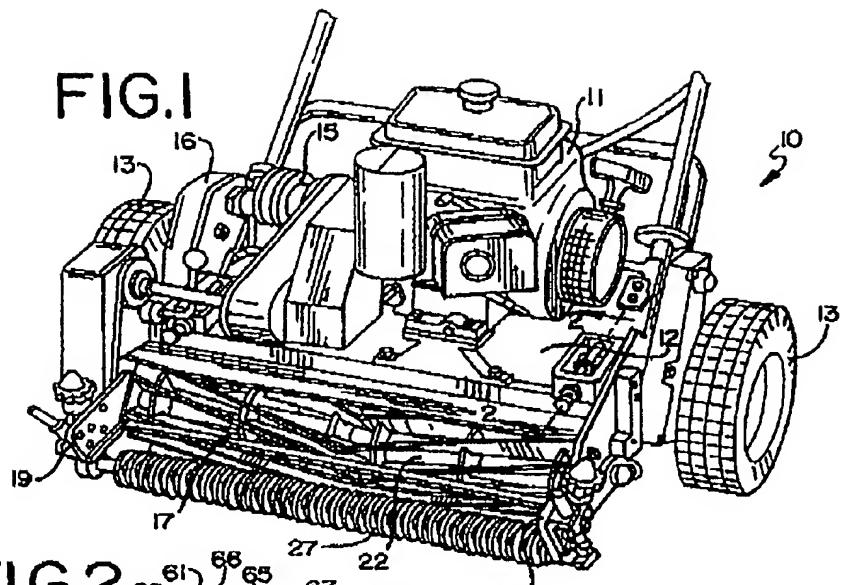
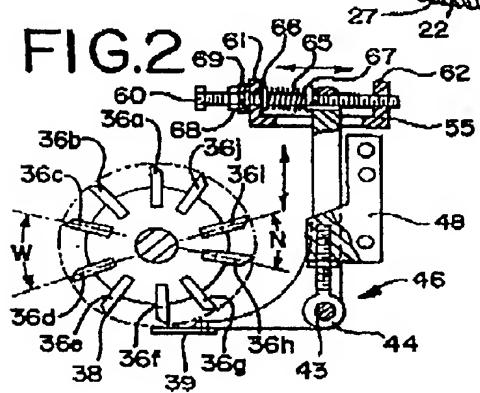
It is also contemplated that the same method of attachment of a blade to a mower unit
10 could be used to attach a blade in a rotary mower system, and such embodiments, with the
necessary modifications, are also contemplated within the scope of the present invention.

**Sorry, the requested images for patent number 2389770
are unavailable.**

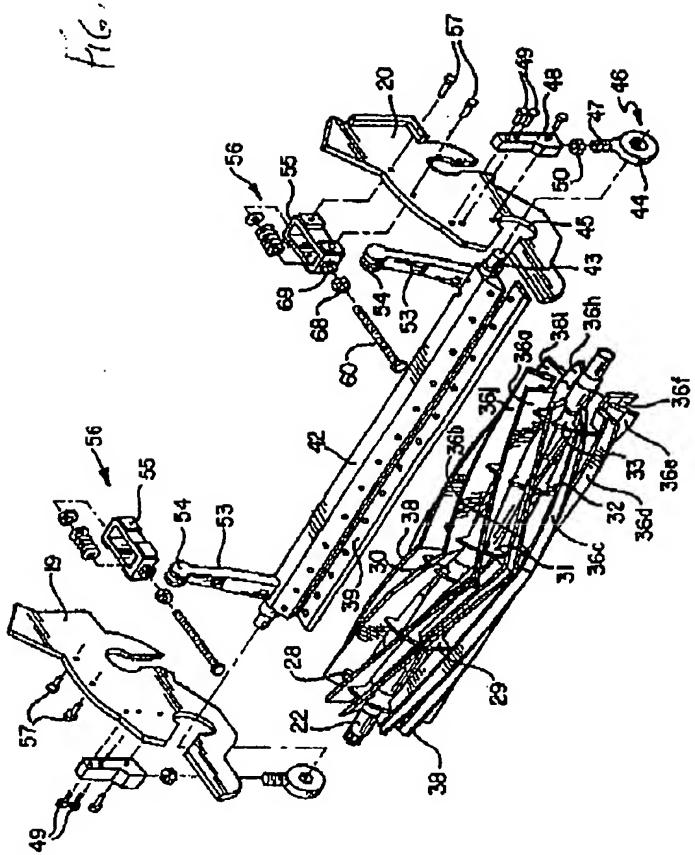
Last Modified: 2002-12-31

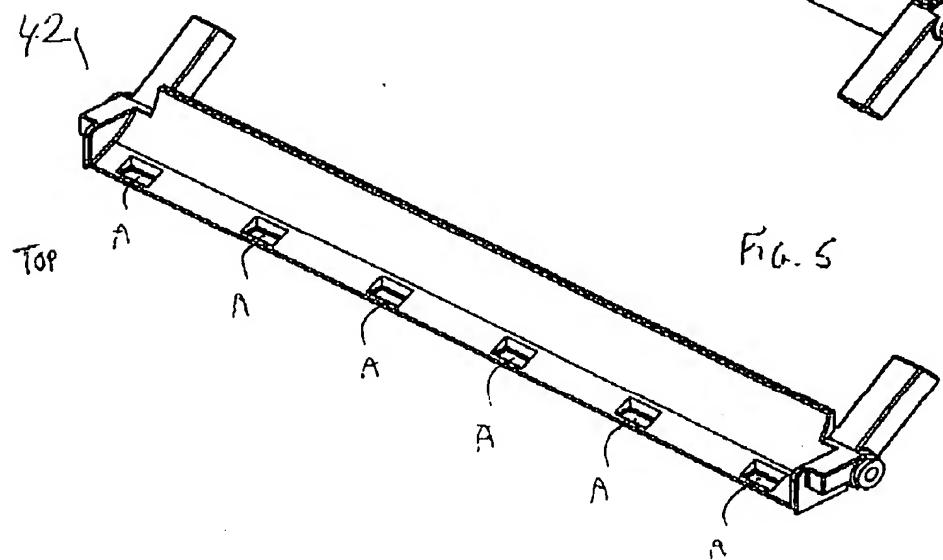
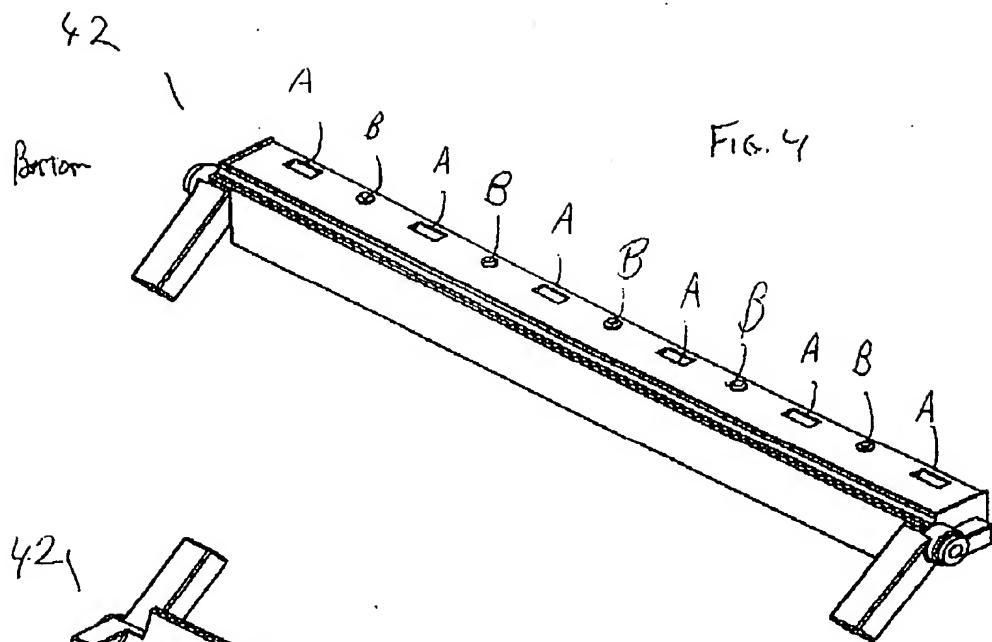


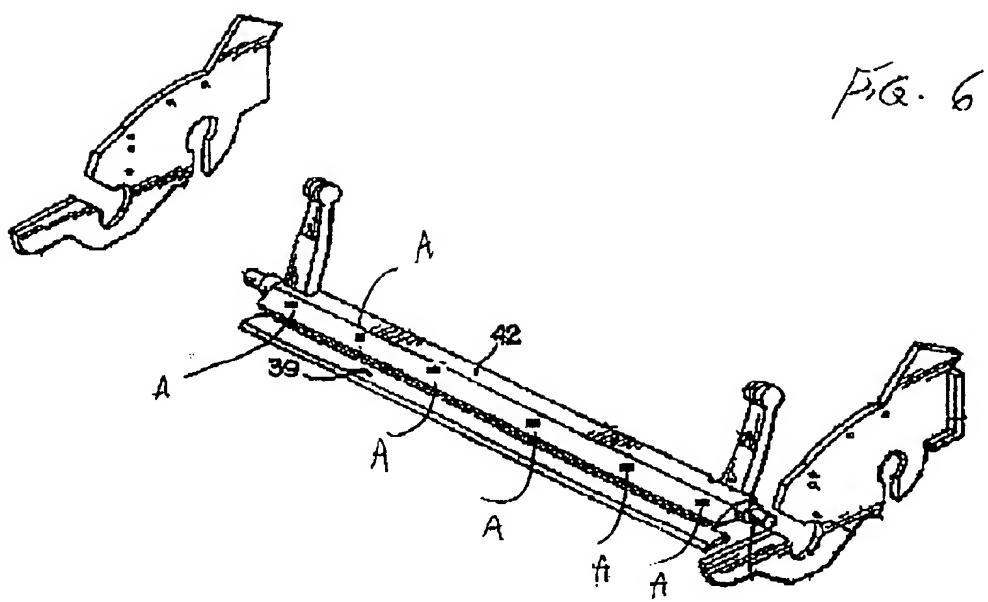
[Important Notices](#)

FIG.1**FIG.2**

۳







**This Page is Inserted by IFW Indexing and Scanning
Operations and is not part of the Official Record**

BEST AVAILABLE IMAGES

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images include but are not limited to the items checked:

- BLACK BORDERS**
- IMAGE CUT OFF AT TOP, BOTTOM OR SIDES**
- FADED TEXT OR DRAWING**
- BLURRED OR ILLEGIBLE TEXT OR DRAWING**
- SKEWED/SLANTED IMAGES**
- COLOR OR BLACK AND WHITE PHOTOGRAPHS**
- GRAY SCALE DOCUMENTS**
- LINES OR MARKS ON ORIGINAL DOCUMENT**
- REFERENCE(S) OR EXHIBIT(S) SUBMITTED ARE POOR QUALITY**
- OTHER:** _____

IMAGES ARE BEST AVAILABLE COPY.

As rescanning these documents will not correct the image problems checked, please do not report these problems to the IFW Image Problem Mailbox.